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भाग 3 संचालन

(पहला पुनरीक्षण)

Selection, Installation, Operation and Maintenance of Horizontal Centrifugal Pumps for Agriculture Application — Code of Practice

Part 3 Operation

(First Revision)

ICS 23.100.10

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Pumps Sectional Committee, MED 20

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Pump Sectional Committee had been approved by the Mechanical Engineering Division Council.

One of the most important factors influencing the trouble free working of a pumpset depends upon its proper operation. It is felt that in case the procedures laid down in this part of the code are followed, the pump-sets will give fairly long trouble free service.

The code of practice for the selection, installation, operation and maintenance of horizontal centrifugal pumps for agriculture applicationis being brought out in four parts. This standard covers the broad guidelines for the operation of horizontal centrifugal pumps for agricultural applications. The other parts in this series are as follows:

Part 1 Selection
Part 2 Installation
Part 4 Maintenance

This Indian Standard was first published in 1980, and it specifies the broad guidelines for the operation of the pumpset.

This revision has been taken up to keep pace with the latest technological developments and practices followed in pumps industry. This revision incorporates the following major changes:

a) Editorial changes have been made.

The composition of the committee responsible for the formulation of this standard is given in Annex A.

Indian Standard

SELECTION, INSTALLATION, OPERATION AND MAINTENANCE OF HORIZONTAL CENTRIFUGAL PUMPS FOR AGRICULTURE APPLICATION — CODE OF PRACTICE

PART 3 OPERATION

(First Revision)

1 SCOPE

Lays down general guidelines for the operation of horizontal centrifugal pumps for agriculture application.

2 OPERATION

2.1 Priming

2.1.1 Pumps should never be started until fully primed, that is, until they have been filled with water and all the air contained in the pump allowed escaping. Priming may be done manually or automatically.

2.1.2 When first put in service, the waterways of the pump are filled with air. If the suction supply is above atmospheric pressure, this air will be trapped in the pump and compressed when the suction valve is opened. Priming is accomplished by venting the entrapped air out of the pump through a valve provided for this pump purpose. If the pump takes its suction from a supply located below the pump, it may be primed by providing a foot valve at the bottom of the suction pipe line or by filling the pump and suctionline with water by opening the delivery valve or a by-pass.

2.1.3 A foot valve does not always seat tightly, and occasionally the pump cannot be primed. However, the rate of leakage is generally very small and it is possible to restore the pump to service by filling and starting it promptly. This tendency to malfunction is increased if the water contains foreign particles such as sand.

2.1.4 The pump can be filled through a funnel attached to the priming connecting form an overhead tank or any other source of the water. If a check valve is used on the pump and the discharge line remains full of water, a small by-pass around the valve permits the water in the discharge line to be used for repriming the pump when the foot valve has leaked. Provision should be made for filling all the water ways and for venting out the air.

2.2 Lubrication

It is recommended that before a pump is placed into service, its proper lubrication should be ensured.

2.3 Starting and Stopping Procedures

Following are the recommendation for starting and stopping the pump.

2.3.1 *Precautions to be taken before Operation***:**

a) Stuffing box

make sure that the stuffing box has been properly packed according to **2.6** and above all that the gland has not been tightened firmly as, otherwise, damage will occur to the packing and the shaft sleeve or shaft. It should be ensure that gland is not tightened unevenly and does not rub on the shaft sleeve or shaft. The shaft should run freely, and it should be possible to turn it by hand with ease.

b) Check the direction of rotation of prime mover with respect to pump.

2.3.2 *Starting the Pump*

a) Close the delivery valve and prime the pump. Ensure that priming of the pump is done as prescribed in the procedure laid down in **2.1**;
b) Start the prime mover;
c) If the delivery pressure dose not rises continuously as speed increase, stop the pump set and prime the pump once more, carefully;
d) Open the delivery valve and observe that pump starts delivering water;
e) Check that pump operates smoothly without undue noise and vibrations;

f) Check that prime mover does not get overloaded. If motor is coupled to the pump, check the current drawn by the motor. If the pump is driven by an engine, check that the engine does not give out smoky exhaust; and

g) Check leakage through stuffing box. Set the gland slowly to allow steady desired leakage observe that the gland does not get heated up.

2.3.3 *Stopping of Pump*

a) Close the valve on delivery side; and

b) Stop the prime mover.

2.4 Restarting Motor Driven Pumps after Power Failure

If the pump id fitted with a check valve to protect it against reverse flow, it may be permitted to restart once power has been re-established. Automatic restart of the pump depends on the type of motor control used.

2.4.1 As pump operating on a suction lift may lose their prime during the time the power is off, it is preferable to use starters with low load protection for such installation to prevent an automatic restart. This does not apply, of course, if the pump is automatically primed or if some protection device is incorporated so that the pump cannot run unless it is primed.

2.5 Restarting a pump after long idle period (after all season period)

a) Replace grease if necessary for bearing and stuffing box sealing is provided;

b) Check pipe for any blockage;

c) Check foot valve flap for its proper function; and

d) Check the stuffing box packing and replace if necessary.

2.6 Stuffing Box

a) Braided graphite cotton or asbestos packing rings should be used and instructions regarding correct installation of the packing inside stuffing box as given should be followed;

b) The stuffing box and shaft or shaft sleeve surface must be thoroughly cleaned prior to insertion of the packing rings. Care should be taken to ensure that the working surfaces are perfectly smooth (no burrs or scores). It is equally important that the pump shaft runs free of vibration and that the clearance between shaft and bushing are adequate to ensure that the packing will not extrude into the gaps under pressure;

c) The packing in spiral form should not be inserted;

d) Packing should be installed in individual rings. Ring should be cut carefully to the exact size by wrapping the packing around the shaft or a mandrel of equal diameter which should be protected by two layers of paper. For braided packing on oblique cut of not more than 30º angle or a straight cut to give a butt joint should be made without leaving any gap at the cut joint. To avoid any fraying of the cut ends of the packing, adhesive tape may be wrapped around the section before cutting;

e) To fit the packing rings, carefully open them radially until the ends are as wide apart as half the shaft diameter, then turn the ends apart in an axial direction until the rings slide over the shaft. Now carefully push each ring into the stuffing box inserting first the joint so that the ring sits squarely against the bottom of the stuffing box or against the previous ring. The joint of succeeding packing rings should be staggered;

f) Assemble the gland ring and tighten the nuts by hand or when using a spanner only tighten to give a slight nip, allowing the packing rings to adapt easily to the packing space;

g) With the pump in operation, tighten the nuts slightly and evenly, only one or two flats at a time, to reduce leakage to the desired minimum;

h) If the shaft temperature increases by any noticeable degree, the gland nuts should be slackened back a little when fluid leakage will provide a cooling effect. When the temperature has returned to ambient, the gland nuts can be slightly tightened to reduce the leakage; and

j) In the running stage proper gland adjustment and a careful watch on the temperature in the vicinity of the stuffing box will ensure good life of the packing. Care taken in fitting and at startup will amply repay in trouble free working, time and cost savings in maintenance, protection of equipment and savings on packing costs.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

Pump Sectional Committee, MED 20

Organization	*Representative(s)*
Thyssenkrupp Industrial Solutions (India) Private Limited, Mumbai	Shri A. K. Nijhawan **(*Chairperson*)**
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